CLAIMS

1. A torsional vibration suppressing control method in an electric motor speed control system constituted by a mechanism for transmitting a driving torque from an electric motor to a load through a driving shaft which is provided on the load side of the electric motor and has a low torsional rigidity, and a control device for feeding back an electric motor mean speed N_{MAVG} obtained by a calculation for a mean value every constant cycle for an electric motor speed detection signal detected by a speed detector for a speed command N_{REF} and calculating a deviation signal, and controlling a current of the electric motor in order to have an electric motor torque in accordance with a torque command signal T_{RFA} obtained by amplifying the deviation signal by means of a speed controller having a proportional gain and an integrator or only the proportional gain,

wherein a signal obtained by multiplying a signal acquired by differentiating the electric motor mean speed signal N_{MAVG} by an inertia time constant τ_M of the electric motor portion is input as an electric motor acceleration torque signal T_{MAFB} to an inertia controller with respect to the torque command signal T_{RFA} output from the speed controller, and

the inertia controller multiplies the electric motor acceleration torque T_{MAFB} by the proportional gain and then outputs a value thus obtained as an inertia control signal T_{MJC} through a second-order or first-order low-pass filter and a second-order or first-order high-pass filter, feeds back the electric motor acceleration torque signal T_{MAFB} to an electric motor acceleration torque command T_{RFAX} obtained by decreasing the inertia control signal T_{MJC} from the torque command signal T_{RFA} output from the speed controller, and controls a current of the electric motor in order to have an electric motor torque in accordance with a signal T_{RFM} obtained by adding, to the acceleration torque command T_{RFAX}, a torque compensation signal T_{RFL} acquired by amplifying a signal of a deviation thereof by

means of an electric motor acceleration torque controller constituted by the proportional gain and the integrator, thereby carrying out a control in order to cancel an electric motor load torque in response to the torque compensation signal T_{RFL} calculated and output in such a manner that the torque command signal T_{RFA} output from the speed controller and the electric motor acceleration torque feedback signal T_{MAFB} are coincident with each other and equivalently enlarging and controlling an inertia of the electric motor portion.

2. The torsional vibration suppressing method in an electric motor speed control system according to claim 1, wherein a proportional gain of the inertia controller is set to have a negative value of 0 to -1, thereby equivalently reducing and controlling the inertia of the electric motor portion.

3. An electric motor control apparatus constituted by speed detecting means for detecting an electric motor speed, a mechanism for transmitting a driving torque from an electric motor to a load through a driving shaft which is provided on the load side of the electric motor and has a low torsional rigidity, and a control device for feeding back an electric motor mean speed N_{MAVG} obtained by a calculation for a mean value every constant cycle for an electric motor speed detection signal detected by a speed detector for a speed command N_{REF} and calculating a deviation signal, and controlling a current of the electric motor in order to have an electric motor torque in accordance with a torque command signal T_{RFA} obtained by amplifying the deviation signal by speed control means having a proportional gain and an integrator or only the proportional gain, comprising:

inertia control means for calculating and outputting an inertia control signal T_{MJC} by an inertia controller from an electric motor acceleration torque signal T_{MAFB} obtained by multiplying a signal acquired by differentiating the electric motor mean speed signal N_{MAVG} by an inertia time constant τ_M of the electric motor portion;

electric motor acceleration torque control means having

electric motor acceleration torque control means having a proportional gain and an integrator for calculating a torque command compensation signal T_{RFL} from a deviation signal of a signal T_{RFAX} obtained by decreasing the electric motor inertia control signal T_{MJC} from the torque command signal T_{RFA} to be an output signal of the speed control means and the electric motor acceleration torque signal T_{MAFB}; and

electric motor torque control means for controlling a current of the electric motor in order to obtain an electric motor torque in accordance with a torque command T_{RFM} to be a sum of the torque command signal T_{RFA} to be an output signal of the speed control means and the torque command compensation signal T_{RFL} to be an output signal of the electric motor acceleration torque control means.